REMARKS

Claims 1, 2, 4, 6, 8, 10-12, 14 and 16-18 are pending.

Rejection Under 35 U.S.C. §103 – Obviousness

Claim 1 is rejected under 35 U.S.C. §103(a) as being unpatentable over Ouderkirk et al. (Ouderkirk) USPAT 6,124,971 in view of Nakanishi et al. (Nakanishi) USPAT 5,587,821.

The Office asserts that **Nakanishi** discloses a liquid crystal display device using a retardation film having characteristics of nx>nz>ny to obtain an improved contrast. The Office further asserts that those of ordinary skill in the art would find the reason, suggestion, or motivation for the liquid crystal display of Ouderkirk, once combined with Nakanishi, to provide an excellent display quality in both of the opposing viewing angle directions.

However, in column 1, lines 40-52 of **Nakanishi**, it is described that a retardation film having characteristics of nx>nz>ny and 0<Nz <0.5 has been proposed. Therefore, it is implied that the using of the retardation film for a liquid crystal display device cannot be a patentable invention. The main point of **Nakanishi's** invention is not only about using the retardation film, but also about modifying the structure of the liquid crystal. Namely, when the retardation film is combined with a conventional STN cell having only one kind of pre-tilt angle, as shown in curve 57 of Fig. 13, the contrast of display (the vertical axis of the graph) becomes asymmetrical in certain viewing angle directions and in certain opposing viewing angle directions (the horizontal axis of the graph). According to the drawings of conventional art, when the absolute value of the

viewing angle is larger than about 10° , the contrast of display in certain viewing angle directions is lower than in certain opposing viewing angle directions.

In Nakanishi, as shown in Fig. 3, regions A and B have film surface conditions that are different from each other in the region 40 of the orientation film 33. This is where the picture elements are located as explained in column 9, lines 49-54. The opposing orientation film 34 is set in the same manner, and the pre-tilt angles of the liquid crystal molecule contacted to each part are different. Therefore, as shown by the curve 56 of Fig. 13, the contrast of the display from the opposing viewing angle is averaged and is symmetrised as explained in column 14, lines 5-31.

As evidenced by comparing curve 56 with curve 57 in Fig. 13 of Nakanishi, it is shown that the excellent contrast characteristic in certain viewing angle directions in the conventional art is controlled while the lower contrast in certain opposing viewing angle directions is improved to obtain the wide viewing angle, only in cases where the absolute value of viewing angle is more than a certain value (more than about 10°). In a narrow viewing angle (namely, in a case of display from around the front), the improved contrast cannot be obtained.

On the other hand, in the present invention, the improvement of the contrast of the display differs from that of **Nakanishi** in obtaining an enlarged viewing angle.

The improved contrast of the present invention can be obtained when the visible light in either the displayed information itself or the background is reflected from the reflection-type polarizing film to the visible side. The intensity of the reflected light is maximized by the reflection light increasing means. The increased light is contrasted with the light (can be colored) emitted to the visible side from the back of the reflection-

type polarizing film in the display device, in either the displayed information itself or the background to increase the contrast.

These features are described in the specification on page 11, lines 1-4, Page 12, lines 3-5, and Page 22, lines7-8. These effects are marked in a case of display from the front rather than in a large viewing angle. It should be understood from the explanation that because the reflection-type polarizing film has a characteristic of passing back the reflected light to the visible side, and page 10, lines 6-11 of the specification also described that "the reflected light passes back to emit to the visible side, therefore, the background becomes metallic silver" in appearance.

Further, in the specification of the first embodiment on page 11, lines 1-4 and under the heading "INDUSTRIAL APPLICABILTY" on page 23, lines 6-12, high contrast and excellent viewing angle characteristic are described distinctly and explained in tandem. Also, it should be clearly understood that the present invention intends to provide a high contrast by the reflected light from the specification as explained on page 12, lines 3-5, and page 22, lines 7-8. The present invention is compatible with conventional knowledge, such as the viewing angle characteristic and the possibility of high-density information display using STN liquid crystal cell as explained on page 11, lines 4-11 as well as the effects of high contrast and various designs.

Also, the Office asserted that the present invention is obvious based on **Nakanishi** by explaining that "the application to transmissive type, but also to reflective type is within the scope of the invention"(Column 15, lines 26-31). However, as previously stated, the mechanism for improving contrast and the result obtained by **Nakanishi** are different from that of the present invention. There is no suggestion in the asserted prior

art about any increased light from the reflection-type polarizing film. Accordingly, the present invention is not rendered obvious by **Nakanishi**.

As the Office admitted in the Office Action, the structure of claim 1 including all of the retardation film, the STN liquid crystal cell, and the reflection-type polarizing film are not disclosed in either **Ouderkirk** or **Nakanishi**. The Applicants have presented many times and reasserts again that the present invention improves contrast of the display by maximizing the strength of a reflected light from the reflection-type polarizing film on the back of the STN liquid crystal cell. This is a remarkable effect that is not taught or suggested in any of the references, thus rendering the present invention inventive.

Conventionally, there have been many types of display devices using a STN liquid crystal cell, such as a device either using or not using a retardation film. The present invention focuses on an effect of a retardation film which compensates an elliptically polarized light of a STN liquid crystal cell. The present invention uses a base which is a STN display device having a retardation film to increase a reflected light from a reflection-type polarizing film on the back of the STN liquid crystal cell. This structure increases a reflected light utilizing properties of a reflection-type polarizing film when the polarizing direction is aligned. These features are not suggested in any of the references. If the structure and effect in the present invention are still regarded as being obvious even though there is no teaching or suggestion in the asserted prior art, it is respectfully submitted the this Office's finding is based on improper "hindsight."

Furthermore, the Office repeated an argument for five times in the Final Office Action that those of ordinary skill in the art had the knowledge and motivation to set the amount of retardation value of the retardation film to compensate for the retardation of

the STN liquid crystal layer. The Office argues that it is a long-standing routine step in the construct of a satisfactory STN liquid crystal display device to obtain an improved contrast. Hence, these features correspond to the light increasing means in the present invention.

However, the Applicants would like to point out that a structure of a display device including a STN liquid crystal cell and a reflection-type polarizing film did not exist previously. Moreover, Ouderkirk did not acknowledge that the use of only the STN liquid crystal cell in the structure would achieve a strong reflected light from a reflection-type polarizing film. Ouderkirk also makes no suggestion of the claimed structure. Therefore, one having ordinary skill in the art could not have had the motivation, theory, and suggestion to arrive at the present invention at the time the present invention was made.

The mechanism in the present invention that would strengthen a reflected light with an appropriate position of a retardation film and a reflection-type polarizing film is clearly distinguished from the mechanism of the asserted prior art references, to improve the contrast in an area of a wide viewing angle in a structure including a retardation film without a reflection-type polarizing film. Consequently, it would be a misunderstanding to equate the contrast improving means in each of the present invention and the references as the same means.

Furthermore, in the Office Action, in the last paragraph on page 14, it is stated that "reflection light increasing means is a matter of lexicography." Please note that the term "reflection light increasing means" has a customary meaning in the art. Therefore, it is not a matter of lexicography. The term "reflection light increasing means" clearly

communicates that the most significant effect of the present invention is to increase the reflected light in the STN liquid crystal display device. These features are not disclosed or taught in the asserted prior art.

Accordingly, the Office's position that claim 1 is unpatentable over **Ouderkirk** in view of **Nakanishi** is unsubstantiated. Applicants respectfully request the Examiner to reconsider the present application.

Claim 1 is rejected under 35 U.S.C. §103(a) as being unpatentable over Ouderkirk in view of Crawford et al. (Crawford) USPAT 5,867,240, Kikuchi et al. (Kikuchi) USPAT 5,440,413, and Arakawa USPAT 5,528,400.

The Office states that it is obvious to modify **Ouderkirk's** display based on teachings of **Crawford**, **Kikuchi**, and **Arakawa.** The Office's given rationale is that **Ouderkirk** discloses a reflection-type polarizer, an absorption-type polarizer, and a light absorbing member; **Crawford** discloses a STN liquid crystal cell, a retardation film having characteristics of Nx>Ny>Nz, an absorption-type polarizer, and a diffusion layer; and **Kikuchi** and **Arakawa** disclose a light compensation of a liquid crystal cell by a retardation film.

Crawford teaches an improvement in viewing angle characteristics, and **Kikuchi** and **Arakawa** teach an improvement in viewing angle dependency of display contrast and display colors by a bi-axial retardation film. These references do not suggest that reflected light from a reflection-type polarizing film of a STN display will be increased based on a combination of certain directions of a retardation film and a reflection-type polarizing film. The

Office and the references offer no reason, motivation, or suggestion to combine the references. Therefore, the Office fails to establish a *prima facie* case of obviousness.

Claims 2, 4, 6, 14, and 16 are rejected under 35 U.S.C. §103(a) as being unpatentable over Ouderkirk in view of Crawford, and further in view of Bosma et al., USPAT 5,576,077 (Bosma).

The Office asserts that it would have been obvious to one having ordinary skill in the art to modify the display of **Ouderkirk,** because **Bosma** discloses a twisted retardation layer which compensates a STN liquid crystal display.

Bosma explains in column 1, lines 59-62 that "the twisted retardation layer preferably possesses the same retardation value ($\Delta n \times d$) and an equal twist angle compared to the liquid crystalline display cell." Therefore, claim 2 is amended to specify the relationship between Δnd and the twist angle, relationship does not exist in **Bosma**.

To obtain a brighter display in a reflection-type liquid crystal display, it is preferable to preset the display in a white mode, which can achieve a fine white effect when no voltage is being applied. Therefore, the twist angle of the twisted retardation film and Δnd are set to be smaller than the twist angle of the liquid crystal element. Δnd increases reflected light from the reflection-type polarizing film by subtracting the retardation of the twisted retardation film from the retardation of the liquid crystal cell and rotate incident polarized light

90° with the remaining retardation. **Bosma** makes a generalization in column 1, lines 15-16 that "STN retardation layers can fully compensate the optical effects occur in STN display cells." However, **Bosma** merely discloses a twisted retardation layer. There is no motivation, reason, or suggestion to arrive at the present invention of increasing light reflected from the reflection-type polarizing film by using the twisted retardation film.

Claims 4, 6, 14, and 16 depend on claim 2. Since claim 2 is not rendered obvious, these claims are patentable. Regarding **Crawford**, it intends to improve a viewing angle as discussed above, thus **Crawford** is not relevant to the present invention. As to **Ouderkirk**, it discloses a backlight, a light absorbing film, and a diffusion layer, but not a STN liquid crystal cell. Therefore, the present invention for intensifying reflected light in STN liquid crystal cell is not rendered obvious by any of the cited references.

Claim 8 is rejected under 35 U.S.C. §103(a) as being unpatentable over Ouderkirk in view of Crawford and Bosma and further in view of Minowa et al. USPAT 4,697,885 (Minowa).

Claim 8 depends on claim 2. **Minowa** discloses a color polarization film, which **Ouderkirk** fails to disclose. However, as discussed above, **Crawford**, **Bosma**, and **Ouderkirk** do not disclose any features recited in claim 2 that would render the present invention obvious. Therefore, this rejection is not rendered obvious.

Claims 10 and 17 are rejected under 35 U.S.C. §103(a) as being unpatentable over Ouderkirk in view of Crawford and Bosma and further in view of Yang et al. USPAT 5,847,798 (Yang).

Claim 10 depends on claim 2, which claim 2 is patentable as explained above; therefore, claim 10 is also patentable.

Claim 17 is an independent claim. Claim 10 comprises a twisted retardation film while claim 17 comprises a retardation film which is not twisted. However, claims 10 and 17 both disclose that a light absorbing member is a color filter, and a STN liquid crystal display device is provided with reflection light increasing means.

Yang discloses a color absorbing layer, but neither **Ouderkirk**, **Crawford**, and **Bosma** disclose nor suggest reflection light increasing means for a STN liquid crystal cell. Accordingly, claims 10 and 17 are not deemed to be obvious to one of ordinary skill in the art.

Claim 11 is rejected under 35 U.S.C. §103(a) as being unpatentable over Ouderkirk in view of Crawford and further in view of Ebihara et al., USPAT 5,990,995 (Ebihara).

Claim 11 depends on claim 1, claiming a solar cell as the light absorbing member. Indeed, **Ebihara** discloses a solar cell. However, claim 1 which is a generic claim of claim 11 is patentable over **Ouderkirk** in view of **Crawford**, **Kikuchi**, and **Arakawa**. Consequently, claim 11 is also patentable.

Claims 12 and 18 are rejected under 35 U.S.C. §103(a) as being unpatentable over Ouderkirk in view of Crawford and Bosma, and further in view of Ebihara.

Claim 12 depends on claim 2. As claim 2 is patentable, by virtue of inherency, claim 12 is also patentable.

Although claim 18 is an independent claim, it recites a main structure of claim 1. Accordingly, since claim 1 is patentable over **Ouderkirk** in view of **Crawford**, claim 18 is also patentable.

Conclusion

For at least the foregoing reasons, it is believed that this application is now in condition for allowance. If, for any reason, it is believed that this application is not in condition for allowance, Examiner is encouraged to contact the Applicants' undersigned attorney at the telephone number below to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 50-2866.

Respectfully submitted,

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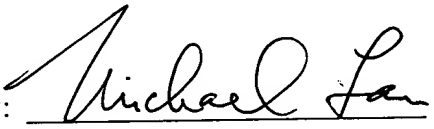
By: 

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Attachments: Petition for Extension of Time w/fee
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